



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/621,852	07/16/2003	Yanjun Ma	SLA0815 (SMT324D)	1808
27518	7590	08/10/2005	EXAMINER	DIAZ, JOSE R
DAVID C RIPMA, PATENT COUNSEL SHARP LABORATORIES OF AMERICA 5750 NW PACIFIC RIM BLVD CAMSAS, WA 98607			ART UNIT	PAPER NUMBER
			2815	

DATE MAILED: 08/10/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	AK
	10/621,852	MA ET AL.	
	Examiner José R. Diaz	Art Unit 2815	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) Responsive to communication(s) filed on 27 May 2005.
- 2a) This action is **FINAL**. 2b) This action is non-final.
- 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) Claim(s) 20-30 is/are pending in the application.
 - 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) Claim(s) _____ is/are allowed.
- 6) Claim(s) 20-30 is/are rejected.
- 7) Claim(s) _____ is/are objected to.
- 8) Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) The specification is objected to by the Examiner.
- 10) The drawing(s) filed on _____ is/are: a) accepted or b) objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) All b) Some * c) None of:
 1. Certified copies of the priority documents have been received.
 2. Certified copies of the priority documents have been received in Application No. _____.
 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) Notice of References Cited (PTO-892)
- 2) Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
 Paper No(s)/Mail Date _____
- 4) Interview Summary (PTO-413)
 Paper No(s)/Mail Date. _____
- 5) Notice of Informal Patent Application (PTO-152)
- 6) Other: _____

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

2. Claims 20-21 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

3. For instance, claim 20 recites the limitation of a gate oxide layer having a length of at least five times greater than the gate region length, and claim 21 recites the limitation of a gate electrode having a length of about half the length of the gate oxide, which are not supported by the specification. It is noted that figures 3-5 appears to show the claimed lengths. However, the disclosure gives no indication that the drawings were drawn to scale. Thus, proportions of features in a drawing are not evidence of actual proportions when drawings are not to scale [MPEP 2126]. Therefore, the disclosure does not support the claimed limitations. This is a new matter rejection.

4. Claims 20-30 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to

which it pertains, or with which it is most nearly connected, to make and/or use the invention.

5. Claim 22 recites a final structure including a temporary LDD overhang cast, which is not described in the specification. Please note that the disclosure clearly discloses a final structure comprised of a gate electrode (30) [consider the final structure shown in figure 5], which is formed after the removal of the temporary LDD overhang cast [consider the intermediate structure comprising a temporary T-shaped structure 20,22 in figure 3].

6. Claims 23-30 are rejected due to their dependency on claim 22.

7. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

8. Claims 22-30 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

9. Regarding claims 22 and 24, the claims are indefinite since it is not clear to the examiner whether the claims are directed to an intermediate structure including a temporary LDD overhang cast or a final structure including a gate electrode, which is formed after the removal of the temporary LDD overhang cast. Clarification is required.

10. Regarding claim 29, claim 29 recites the limitation "the gate electrode replacement plug" in lines 1-2. There is insufficient antecedent basis for this limitation in the claim.

Art Unit: 2815

11. Claims 25-27 are rejected due to their dependency on claim 24.
12. Claims 23, 28 and 30 are rejected due to their dependency on claim 22.

Claim Rejections - 35 USC § 103

13. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

14. As far as understood, claims 20-30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kittl et al. (US 2002/0045307A1) in view of Chapman (US Pat. No. 6,010,929).¹

Regarding claims 20 and 22-29, Kittl et al. teaches a sub-micron MOS transistor comprising: a substrate (400) [see fig. 4d]; and an active region [consider portion of the substrate (400) in which source/drain regions, LDD regions, and channel region are formed. See figure 4d] including:

a gate region (portion of the substrate overlapped by gate (408) and located between LDD regions. See figure 4d, attached below], having a length of less than one micron [see paragraph [0038] and fig. 4d].²

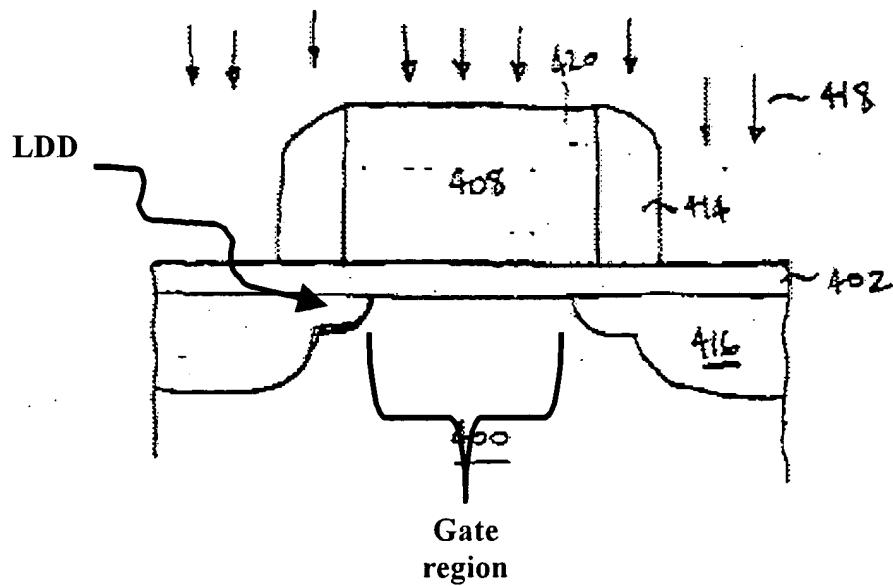
a. source region (416) including a LDD source region (LDD) (see fig. 4d, attached below);

¹ Please note that the examiner rejects claims 22-30 based on the final structure shown in figure 5, which does not include the claimed temporary LDD overhang cast.

Art Unit: 2815

a drain region (416) including a LDD drain region (LDD) (see fig. 4d, attached below); and

a gate oxide layer (402) overlying the gate region (Gate Region), which has a length that is longer than the length of the gate region [see fig. 4d, attached below].



However, Kittl et al. fails to teach the ion concentration of said source region and said drain region of between about $1 \times 10^{20} \text{ cm}^{-3}$ to $1 \times 10^{21} \text{ cm}^{-3}$; the ion concentration of said LDD source region and said LDD drain region of between about $1 \times 10^{19} \text{ cm}^{-3}$ to $5 \times 10^{19} \text{ cm}^{-3}$; and a gate oxide having a length at least five times greater than the gate region length.

² Consider the region of the substrate overlapped by gate (408), which has a length that is smaller than the length of the gate (408) [see figure 4d, attached hereto]. Please note that in paragraph [0038], last sentence, Kittl et al. teaches a gate length of less than 0.1 microns.

With regards to the claimed ion concentrations, Chapman teaches that it is well known in the art to form the source and drain regions having an ion concentration of between about 10^{20} cm⁻³ (col. 4, lines 50 and 52), and LDD regions having an ion concentration of between about 10^{19} cm⁻³ (col. 4, lines 3-4).

With regards to the claimed limitation of a gate oxide having a length at least five times greater than the gate region length, Kittl et al. teaches a length of the gate oxide layer (402) which is longer than the length of the gate region [see figure 4d, above]. However, Kittl et al. is silent with respect to the claimed range of at least five times greater than the gate region length. It would have been obvious to one of ordinary skill in the art to include a gate oxide having the claimed length, since it has been held that the claimed limitation is *prima facie* obvious without showing that the claimed ranges achieve unexpected results relative to the prior art range. In re Woodruff, 16 USPQ2d 1935, 1937 (Fed. Cir. 1990). See also In re Huang, 40 USPQ2d 1685, 1688(Fed. Cir. 1996)(claimed ranges of a result effective variable, which do not overlap the prior art ranges, are unpatentable unless they produce a new and unexpected result which is different in kind and not merely in degree from the results of the prior art). See also In re Boesch, 205 USPQ 215 (CCPA) (discovery of optimum value of result effective variable in known process is ordinarily within skill of art) and In re Aller, 105 USPQ 233 (CCPA 1955) (selection of optimum ranges within prior art general conditions is obvious).

Kittl et al. and Chapman are analogous art because they are from the same field of endeavor as applicant's invention. At the time of the invention it would have been obvious to a person of ordinary skill in the art to include source and drain regions having

Art Unit: 2815

an ion concentration of between about 10^{20} cm⁻³ (col. 4, lines 50 and 52); LDD regions having an ion concentration of between about 10^{19} cm⁻³; and a gate oxide having a length at least five times greater than the gate region length. The motivation for doing so, is for reducing short channel effects. Therefore, it would have been obvious to combine Chapman with Kittl et al. to obtain the invention of claims 20-30.

Regarding claim 21, Kittl et al. teaches source and drain electrode (426) and gate electrode (428) (see fig. 4f), wherein the gate electrode has a length that is smaller than the length of the gate oxide layer (see fig. 4f). However, Kittl et al. is silent with respect to the claimed gate electrode length of about half the length of the gate oxide layer. It would have been obvious to one of ordinary skill in the art to include a gate electrode length of about half the length of the gate oxide layer, since the claimed limitation is *prima facie* obvious without showing that the claimed ranges achieve unexpected results relative to the prior art range. In re Woodruff, 16 USPQ2d 1935, 1937 (Fed. Cir. 1990). See also In re Huang, 40 USPQ2d 1685, 1688(Fed. Cir. 1996)(claimed ranges of a result effective variable, which do not overlap the prior art ranges, are unpatentable unless they produce a new and unexpected result which is different in kind and not merely in degree from the results of the prior art). See also In re Boesch, 205 USPQ 215 (CCPA) (discovery of optimum value of result effective variable in known process is ordinarily within skill of art) and In re Aller, 105 USPQ 233 (CCPA 1955) (selection of optimum ranges within prior art general conditions is obvious).

Regarding claim 30, Kittl et al. teaches a polysilicon gate electrode (408) [see paragraph 0026].

Response to Arguments

15. In response to arguments about the first and second prima facie requirements, the court has held that as long as some motivation or suggestion to combine the references is provided by the prior art taken as a whole, the law does not require that the references be combined for the reasons contemplated by the inventor. *In re Beattie*, 24 USPQ2d 1040 (Fed. Cir. 1992) citing *In re Kronig*, 539 F.2d 1300, 1304, 190 USPQ 425, 427-28 (CCPA 1976) and *In re Lintner*, 458 F.2d 1013, 1016, 173 USPQ 560, 562 (CCPA 1972). Thus, it is considered that the motivation suggested by the examiner is proper and thus, the first and second prima facie requirements were properly addressed.

16. In response to arguments about the third prima facie requirement, the arguments are moot in view of the new ground of rejection.

Conclusion

17. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Itoh et al. (US Pat. No. 6,235,564 B1) teaches a method of forming a MISFET by using a dummy gate electrode (3) which later is removed to form a gate electrode (8) (see figs. 3-12); and Shirato et al. (US Pat. No. 5,219,770) teaches the formation of source and drain contacts (10b and 10c) (see fig. 1B).

18. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP

Art Unit: 2815

§ 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Correspondence

Any inquiry concerning this communication or earlier communications from the examiner should be directed to José R. Diaz whose telephone number is (571) 272-1727. The examiner can normally be reached on Monday through Thursday.

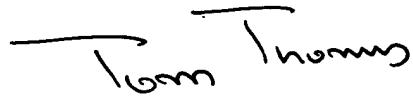
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Thomas can be reached on (571) 272-1664. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Art Unit: 2815

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



José R. Diaz
Examiner
Art Unit 2815



TOM THOMAS
SUPERVISORY PATENT EXAMINER